

SOV/137-58-9-19847

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 249 (USSR)

AUTHOR: Kushta, G.P.

TITLE: On the Problem of the Structural State of the Lattice of a Naturally-aged, Supersaturated Solid Solution with an Al Base.
II. On the Nature of Lattice Distortions Which Increase the Hardness of Al-based Alloys Subjected to Aging (K voprosu o strukturnom sostoyanii reshetki yestestvenno sostarennogo peresyshchennogo tverdogo rastvora na osnove alyuminiya.
II. O kharaktere uprochnyayushchikh iskazheniy reshetki v stareyushchikh splavakh na osnove alyuminya)

PERIODICAL: Nauchn. yezhegodnik. Chernovitsk. un-t, 1956 (1957), Vol 1, Nr 2, pp 268-271

ABSTRACT: Commercial Al of the AOO type and duralumin of the D-1 type were investigated. X-ray photographs of an Al powder, which had been annealed at a temperature of 200°C in order to relieve stresses induced in the course of its preparation, were taken together with X-ray photographs of powdered D-1 alloy after the latter has been subjected to quenching at 500° followed by natural aging for a period of 15 days or by artificial aging at

Card 1/2

SOV/137-58-9-19847

On the Problem of the Structural State of the Lattice (cont.)

a temperature of 2250 for a period of three hours. The X-ray photographs were taken at room temperature as well as at a temperature of -183°. It was established that neither the high strength of the duralumin nor the increase in the strength of this metal in its naturally-aged state are the results of an increase in cohesive forces within the lattice of the solid solution. Changes in the relative intensity of the lines observed in the alloy investigated are directly related to the appearance of static distortions in the lattice of the solid solution. The values of $\sqrt{U_{st}^2}$ for naturally and artificially aged duralumin amount to 0.1658 and 0.265 angstrom, respectively. The increase in the strength of duralumin, as compared with pure Al, is apparently connected with specific nonuniformities in the substructure of naturally-aged duralumin (regions of accumulation of atoms of impurities).

L.M.

1. Aluminum alloys--Crystal structure
2. Aluminum alloys--lattices
3. Aluminum alloys--Aging
4. Hardness--Analysis
5. Aluminum powders--X-ray analysis

Card 2/2

SOV/137-58-9-19845

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 249 (USSR)

AUTHORS: Kushta, G.P., Rybaylo, O.I.

TITLE: ~~On the~~ Problem of the Structural State of the Lattice of a Naturally-aged, Supersaturated Solid Solution With an Al Base. I. An Investigation of the Initial Stage of Aging in an Al Alloy by the Method of Harmonic Analysis of Intensity-distribution Curves of X-ray Interference Lines (K voprosu o strukturnom sostoyanii reshetki yestestvenno sostarennogo peresyshtchennogo rastvora na osnove alyuminiya. I. Issledovaniye nachal'noy stadii stareniya alyuminiyevogo splava metodom garmonicheskogo analiza krivyykh raspredeleniya intensivnosti rentgenovskikh interferentsiy)

PERIODICAL: Nauchn. yezhegodnik. Chernovitsk. un-t, 1956 (1957), Vol 1, Nr 2, pp 272-275

ABSTRACT: X-ray diffraction studies were performed on duralumin of the D-1 type, quenched in water at a temperature of 510°C and subjected to natural aging at room temperature for a period of 12 days. A harmonic analysis of the intensity curves was performed on line (422). It is established that the widening of the

Card 1/2

SOV/137-58-9-19845

On the Problem of the Structural State of the Lattice (cont.)

lines is connected with the dispersion of blocks as well as with micro-stresses. A Fourier analysis of the shape of the line demonstrated that the mean-square displacement of atoms, $\sqrt{\Delta L^2}$, at distances up to 50-70 angstrom increases as a linear function of L, which corresponds to the presence of a homogeneous-deformation region the linear dimensions of which are of the order of $(0.5-0.7) \times 10^{-6}$ cm. The relative deformation of the lattice, $\epsilon = \sqrt{\Delta L^2}/L$, attains a value of approximately 10^{-3} cm. The magnitude of the mean dimension of regions of coherent dispersion, computed from the value of the Fourier coefficient, amounts to 0.56×10^{-6} cm in the case of naturally-aged duralumin; this value coincides with the dimensions of the regions of homogeneous deformation. Along with lattice distortions, structural peculiarities discovered in a naturally-aged alloy determine the degree of hardening of the latter.

L.M.

1. Aluminum alloys--Crystal structure
2. Aluminum alloys--Lattices
3. Aluminum alloys--Stresses
4. X-ray diffraction analysis--Applications
5. Harmonic analysis--Applications

TITLE: Duralumin

Card 2/2

Kushta, G. P.

AUTHORS: Kushta, G. P. and Strongin, B. G.

126-1-37/40

TITLE: On the sub-microscopic structure of metals which crystallise under conditions of vibration. (O submikroskopicheskoy strukture metallov i splavov, kristallizovavshikhsya v usloviyakh vibratsiy).

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol.5, No.1, pp.187-188 (USSR)

ABSTRACT: Although vibration effects on crystallisation are being utilised industrially (Refs.2 and 3), so far, insufficient attention has been paid to the possible changes of the sub-microscopic structure of alloys crystallised inside a vibration field. It is to be anticipated that the improved strength characteristics of alloys which are vibrated during crystallisation is due not only to microstructural but also to sub-microstructural changes, i.e. to the reduction in size of the mosaic blocks and increase of their angular shifts relative to each other. For verifying these assumptions, the authors investigated the influence of vibrations on the process of crystallisation of zinc and of a zinc-aluminium alloy containing 21% Al. A mechanical vibration set-up was used consisting of a massive wooden base with a d.c. motor of 0.125 h.p., on

Card 1/2

126-1-37/40

On the sub-microscopic structure of metals which crystallise under conditions of vibration.

the shaft of which a sleeve with a mobile eccentric, weighing about 30 g was fitted. The vibration amplitude and frequency were determined by changing the eccentricity of the load and varying the voltage on the motor terminals. The metal was first overheated to 650°C; the vibrator was switched on when the melt temperature was 500°C. Ingots weighing 350 to 370 g were produced at various vibration frequencies and also without vibration. The results of the experiments enabled conclusions to be made on the possibility of choosing optimum vibration regimes at which the microscopic and the sub-microscopic structure will be the most favourable from the point of view of various transformations in the solid phase which will lead to a further strengthening of the alloy. There are 1 figure and 6 references, 3 of which are Slavic.

SUBMITTED: January 30, 1957.

ASSOCIATION: Chernovtsy State University. (Chernovitskiy Gosudarstvennyy Universitet).

AVAILABLE: Library of Congress.

Card 2/2

S/137/62/000/001/125/237
A052/A101

AUTHORS: Kushta, G. P., Shtrachman, K. M.

TITLE: Investigation by the differential thermography method of the decomposition process of supersaturated solid solutions in the Al-Zn system

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 10, abstract 1169 ("Nauchn. ezhegodnik za 1957 g. Chernovitsk. un-t". Chernovitsy, 1958, 485-488)

TEXT: The decomposition process of supersaturated solid solutions in the Al-Zn system was studied by the method of differential thermal analysis with Kurnakov's pyrometer at the rate of heating 4 deg./min. As initial materials chemically pure Al and Zn were used; the alloys contained 0, 10, 15, 20, 25, 30, 35 and 40% Zn. Three thermal effects were detected on thermographs taken in the process of heating the samples water-hardened at 400°C. The first exothermic effect, observed at 90 - 120°C, shifted into the region of lower temperatures with an increase of Zn content in the alloy and was conditioned by the formation of the next short-range order regions at the decomposition of the

Card 1/2

S/137/62/000/001/125/237
A052/A101

Investigation by the differential ...

solid solution. The piling up of Zn atoms into zones reduced the internal energy of the alloy and was accompanied by the heat liberation. The second endothermic effect, observed at 140 - 200°C, shifted with an increase of Zn content into the region of higher temperatures and was conditioned by the superposition of two processes - elimination of unstable short-range order regions and enriching the remaining regions with Zn. The second process prevailed since the heat absorption took place. The third exothermic effect took place at 200 - 260°C, that is at the temperatures near to those on the equilibrium constitution diagram. This effect was conditioned by the incoherent decomposition of the solid solution and shifted, with an increase of Zn content, into the region of high temperatures.

L. Belyakov

[Abstracter's note: Complete translation]

Card 2/2

SOV/3870

PHASE I BOOK EXPLOITATION

Renthenohrafiya metaliv (Metal Radiography) [L'viv] Vyd-vo
L'vivskoho univ., 1959. 386 p. Errata slip inserted.
3,000 copies printed.

Ed.: B. Polubichko; Tech. Ed.: T. Saranyuk.

PURPOSE: This book is intended for physics students and radio-
graphers in metallurgical laboratories of factories and scien-
tific research institutes.

COVERAGE: The book is a course of lectures given to students spec-
ializing in the physics of metal radiography and is the first
textbook on the subject in the Ukrainian language. The book is
in two parts. Part I discusses the principles of x-ray struc-
tural analysis, covering such subjects as x-ray physics, cry-
stallography, and the diffraction of x-rays in crystals. Part
II covers radiographic methods in metallurgy and discusses re-
gularity patterns in the crystal lattice structure of metals,
x-ray analysis of solid solutions, x-ray analysis of textures, etc

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Introduct

- Ch. I. X-h
- 1. X-ray
- 2. X-ray

Ch. II. Physic

- 3. Basic regularity patterns of the continuous spectrum

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STRUCTURAL ANALYSIS

3

5

12
12
19

27
28

24(2), 24(6), 18(6) SOV/126-7-2-26/39
AUTHORS: Kushta, G. P., Mikhaylyuk, I. P. and Korolyuk, G. F.
TITLE: Influence of Alloy Element Additions on the Interatomic
Bond Forces of the Aluminium Lattice (Vliyaniye
legiruyushchikh primesey na sily mezhatomnoy svyazi
v reshetke alyuminiya) 1. Influence of Copper
(1. Vliyaniye medi)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 2,
pp 299-301 (USSR)

ABSTRACT: The study of the mechanism by which the characteristic
temperature of solid solutions changes as a function of
their composition, is one of the most important means
for the determination of the nature of reactions between
atoms of solid solutions. In a paper by Kushta (Ref 7),
one of the authors has shown that the great strength of
the duralumin type of alloys is not associated with
formation of stronger bond forces between the atoms in
the lattice of these alloys. Duralumin, however, contains
a number of alloy elements (Cu, Mg, Si, Mn and others),
each of which may exert a different influence, as the
nature and extent to which bond forces change in solid

Card 1/6 solutions depend on the properties of each alloy element

SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

and its concentration in the solid solution (see Refs 3, 8 and 9). It appears appropriate that the influence of each of the alloy constituents on the bond forces in the solid solution should be studied. Technically pure aluminium of specification AI and electrolytic copper were used as materials for making alloys. Specimens were made in porcelain crucibles by thermodiffusion of copper in molten aluminium at 800°C. Melting was carried out under a layer of flux. The characteristic temperature of the specimens was determined by the change of the heat factor of the X-ray interference line intensity. The specimens for X-ray exposure were made from powder produced by filing, which was annealed for 10 hours in vacuum at 500°C, and had a cylindrical shape*, the diameter being 0.8 mm (* The practically instantaneously cooled powder specimens were X-rayed at once after cooling. This permits the assumption that the copper concentration in the solid solution was practically identical with the one given.) X-raying was carried out in an open camera of the type RKD in the rays of a copper

Card 2/6

SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces
of the Aluminium Lattice 1. Influence of Copper

anticathode at two temperatures - room temperature and liquid air temperature. In the last case, the specimen was sprayed with a stream of liquid air by means of a special siphon device (Ref 1). In order to obtain the line (333) for aluminium in X-ray pictures, a special (non-standard) collimator was used. X-ray photographs, taken at room temperature and at a low temperature, were developed under identical conditions and were then photometered in a visual microphotometer of type MF-2. For the determination of the characteristic temperature from the X-ray results a method was used which had been worked out by Il'ina et al. and Kurdyumov et al. (Refs 10 and 3 respectively). The relative intensities of the lines (111), (222), (422) and (333) were experimentally measured. The results of the measurements were neutralised along two directions of the X-ray picture for 2-5 X-ray photographs. The intensity of the lines was calculated as an area, bounded by the photometric curve and the base line. The intensity of the

Card 3/6 line (333) was calculated as the sum of the areas of two

SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

lines of the $K\alpha_{1,2}$ doublet. In Fig 1 the results of the measurements are shown in the form of a logarithmic dependence of the intensity ratio

$$\frac{(i_{h_2k_2l_2}/i_{h_1k_1l_1})_{20^\circ}}{(i_{h_2k_2l_2}/i_{h_1k_1l_1})_{-183^\circ}} = \frac{\alpha_1}{\alpha_2}$$

on the difference of the sums of the index squares of corresponding pairs of lines for pure aluminium and its alloys with 2, 3 and 4 wt.% copper. From the figure it can be seen that the change of the heat intensity factor on introducing copper into the solid solution changes in the direction of decrease of the mean square of displacement of the atoms during oscillations, and of increase in the temperature of the solid solution, i.e. in the direction of increase of the bond forces of

Card 4/6

SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

the lattice. From the tangent of inclination of the straight line in Fig 1, using the formula

$$\ln \frac{\alpha_1}{\alpha_2} = A \varphi(\theta) \left(\sum h_2^2 - \sum h_1^2 \right),$$

where $A = \frac{3h^2}{a^2 m k \theta}$, $\varphi(\theta) = \left[\frac{\Phi(\theta|T_1)}{\theta|T_1} - \frac{\Phi(\theta|T_2)}{\theta|T_2} \right]$

Φ - Debye's function, the values of $\Delta \bar{v}_2^2$ and of the characteristic temperature θ_2 were determined. The calculated values of θ and \bar{v}_2^2 , which are characteristic of the strength of the interatomic bond of the solid solution lattice, are shown in the Table. The accuracy with which the characteristic temperature can be determined is within ± 8 to 10° . The observed increase in bond force with increase in copper content in the solid solution coincides with a decrease in the lattice parameter of aluminium on introducing copper. As the

Card 5/6

SOV/126-7-2-26/39

Influence of Alloy Element Additions on the Interatomic Bond Forces of the Aluminium Lattice 1. Influence of Copper

interatomic bond forces in the lattice of duralumin are practically identical with those of pure aluminium (Ref 7), it can be assumed on the basis of the results obtained in this investigation, that the influence of other additions appears to be of opposite sign. It is understood that these assumptions require further confirmation. Thus, the most important alloy element addition in duralumin, copper, increases the bond forces in the lattice in the solid solution, and only the joint influence of all additions leaves the bond strength in the lattice practically unaltered; the strengthening of the alloy observed is due to other strengthening factors (Ref 7) which bring about a more effective employment of the bond forces existing in the lattice.

There are 1 figure, 1 table and 10 references, all of which are Soviet.

(Note: This is a slightly abridged translation except for the figure and table captions)

ASSOCIATION: Chernovitskiy gosudarstvennyy universitet
(Chernovtsy State University)

SUBMITTED: October 13, 1957

Card 6/6

66237

SOV/126-8-3-22/33

18.7520, 18.1220

AUTHORS: Kushta, G.P. and Rybaylo, O.I.

TITLE: A Few Rules According to Which Interatomic Bond Forces Change in α -Solid Solutions of Systems Forming Intermetallic Compounds

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 3, pp 457-459 (USSR)

ABSTRACT: In the present work changes of interatomic bond forces in α -solid solutions of the systems Cu-Zn and Cu-Sn have been studied. The estimation of the change in interatomic bond forces of the alloys was carried out by X-ray determination of the characteristic temperature of the alloy according to a method worked out by G.V.Kurdyumov (Ref 1) which involves exposure at two temperatures - room temperature and liquid nitrogen temperature. In making Cu-Zn alloys, an alloy containing approximately 30% Cu and 70% Zn was first prepared. Electrolytic copper and granulated zinc free from antimony were used. By melting the alloy with the corresponding quantity of copper in hermetically enclosed graphite crystals, alloys of the following zinc content were made: 4.33, 8.74, 19.78, 29.24 and 38.62 at %.

Card 1/4

4

66237

SOV/126-8-3-22/33

A Few Rules According to Which Interatomic Bond Forces Change in
 α -Solid Solutions of Systems Forming Intermetallic Compounds

The alloy for making Cu-Sn alloys contained approximately 60% Sn. Tin of the ChDA brand was used. The tin content in the Cu-Sn alloys obtained was 1.09, 2.19, 4.46, 6.95 and 9.31 at %. The composition of the alloys was thoroughly checked by chemical and spectral analysis and also by X-rays according to the solid solution lattice parameter. From the alloys thus obtained, powders were made by filing and a fraction was removed which gave continuous lines in the X-ray picture. In order to remove stresses arising during filing, the powders were annealed in evacuated glass ampoules at a temperature of 360°C for 4 hours. X-Ray photographs were taken of cylindrical specimens of 0.6 mm diameter made by applying the annealed powder to a thin glass hair wetted with cellulose nitrate varnish. K-Irradiation of iron was used. There was no oxidation of the specimen. Cooling of the specimen to liquid air temperature was brought about by continuously spraying it with a washing jet of liquid air in an open chamber by a method described by Iveronova (Ref 2). The X-ray exposures taken from the

Card 2/4

4

66237

SOV/126-8-3-22/33

A Few Rules According to Which Interatomic Bond Forces Change in
 α -Solid Solutions of Systems Forming Intermetallic Compounds

same specimen at various temperatures were developed simultaneously. The X-ray pictures obtained were photometered in the microphotometer MF-2 and the ratio between the intensities I_{111}/I_{222} was determined. The values of I_{111}/I_{222} for each of the specimens, at two temperatures from which the characteristic temperature of the alloy was determined, represent the average result of several measurements from two or three X-ray pictures. These average results were used for calculation of the value of m_{op}^2 , which is a measure of the interatomic bond of the alloy lattice. In the figure these values are represented in relation to the calculated value of the electron concentration for the studied alloys. As can be seen from the figure, the change (decrease) in interatomic bond forces as a function of the electron concentration for three solutions in the systems Cu-Zn and Cu-Sn is characterized by complex curves converging at a point corresponding to the limiting electron concentration of the α -phase. Each of these curves can be approximated, however, to two straight lines crossing

Card 3/4

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SOV/126-8-3-22/33

A Few Rules According to Which Interatomic Bond Forces Change in
 α -Solid Solutions of Systems Forming Intermetallic Compounds

at points which correspond to a practically identical value of interatomic bond forces and alloy atom content (~ 5 at %) for both systems. The decrease in interatomic bond force observed corresponds only qualitatively to the increase in repelling forces in the lattice but is not determined simply by these forces. From the actual shape of the curves for the alloys Cu-Zn and Cu-Sn it can be concluded that the influence of local stresses of the lattice potential, caused by the presence of ions of different valency and excluding energetic electron bands in the alloy, prevails over the influence of the electron concentration. The above influence limits the action of the well-known Hume-Rothery rule. There are 1 figure and 2 Soviet references.

n.b. This is a complete translation.

ASSOCIATION: Chernovitskiy gosudarstvennyy universitet
(Chernovtsy State University) ✓

SUBMITTED: March 31, 1959

Card 4/4

83997

S/149/60/000/003/012/012/XX
AOC6/A001

18.12.10

AUTHORS:

Kushta, G.P., Mikhaylyuk, I.P.

TITLE:

The Effect of Alloying Elements on Interatomic Forces and Lattice Distortion in Solid Aluminum-Base Solutions

PERIODICAL:

Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1960, No. 3, pp. 139-142

TEXT:

The effect of alloying elements on the magnitude of interatomic forces in an aluminum lattice was studied to gather data on the cohesion forces and the distortion of the lattice in solid aluminum-base solutions. These data will serve to establish general physical and chemical concepts of alloying when developing alloys with high strength and heat resistance characteristics. The authors present some results of an X-ray analysis into the effect of Cu, Mn and Zn admixtures on the magnitude of interatomic forces and on the distortion of the lattice. This effect was studied on alloys with 2, 3 and 4 weight % Cu (0.86; 1.29 and 1.8 at %). Radiographs were taken with a PKA (RKD) type camera at room and liquid air temperatures to determine the characteristic temperature of freshly hardened supersaturated solid Al-Cu solutions with various Cu content. $K\alpha_{1,2}$

Card 1/4

APP

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S/149/60/000/003/012/012/XX
A006/A001

The Effect of Alloying Elements on Interatomic Forces and Lattice Distortion in Solid Aluminum-Base Solutions

radiation of copper was used. The analysis was made on four lines of the Al-base solid solution: (111), (222), (422) and (333) + (511). The results of the analysis are represented in a graph and show that the characteristic temperature increases when alloying aluminum with copper and attains a value which exceeds almost by 100°C that of pure aluminum. Correlating this result with the fact of the unchanged magnitude of interatomic forces when strengthening commercial duralumin, it is assumed that the effect of other elements or at least of one of them has an opposite effect. This was checked by a comparative investigation of alloys with Cu, Mg and Zn admixture where only two lines (111) and (311) were subjected to photometrical analysis ($K\alpha_{1,2}$ radiation of iron). The alloys were prepared of commercial "A00" aluminum, electrolytic copper and chemically pure Zn and Mg. The characteristic temperatures of the following alloys were determined: 1) with 0.85; 1.54; and 2.03 weight % Cu (0.4; 0.7; 0.86 at %); 2) with 1.3; 5; 10 and 15 weight % Zn (0.42; 1.26; 2.1; 4.2; 6.3 at %) and 3) with 1.2, 4.3, and 7.4 weight % Mn. The results obtained were not different from the aforementioned data. A regular drop of the characteristic temperature of Al-Zn was stated at a higher Zn content, attaining 100°C at 15 weight %. An analogous result was obtained for Al-

Card 2/4

83997

S/149/60/000/003/012/XX
A006/A001

The Effect of Alloying Elements on Interatomic Forces and Lattice Distortion in Solid Aluminum-Base Solutions

Mg alloys with the difference that a drop of the characteristic temperature by about 100°C was observed at 7.4 weight % Mg. These results are in disagreement with literature data where a change of the characteristic temperature was not observed, probably due to an Mg concentration not higher than 1.4%. This discrepancy was checked by ionization recording of the intensity of X-ray interferences. Measurements were made in monochromatized irradiation using MCT-17 (MST-17) type meters. The results obtained agree with the photometrical data. Thus in the Al-Mg-Cu system an increase in the characteristic temperature of solid solutions may be expected, apparently resulting from the presence of copper. This is in agreement with data of Reference 10 on the strengthening of the mentioned alloys merely by the increased effect of hardening but not of the aging effect. The selection of an optimum composition of the alloy must be made by taking into account all the strengthening factors. The authors distinguished the values of dynamic and static distortion of the lattice of the solid solution: $\sqrt{u_{dyn}^{-2}}$ and $\sqrt{u_{st}^{-2}}$.

$\sqrt{u_{st}^{-2}}$. The values for $\sqrt{u_{st}^{-2}}$

obtained were about 0.2 Å at a high concentration

Card 3/4

83997

S/149/60/000/003/012/012/XX
A006/A001

The Effect of Alloying Elements on Interatomic Forces and Lattice Distortion in Solid Aluminum-Base Solutions

of the admixtures: at a low concentration of Zn a satisfactory agreement was found between $\sqrt{u_{st}^2}$ and u_{st} , calculated by V.I. Iveronova's formula (Reference

11). (0.106 and 0.098 Å respectively for an Al + 1% Zn alloy, and 0.153 and 0.162 Å for an Al + 3% Zn alloy). There is 1 graph and 11 Soviet references.

ASSOCIATION: Chernovitskiy gosudarstvennyy universitet (Chernovitsy State University), Kafedra rentgenometallogiziki (Department of Roentgen Physics of Metals) ✓

SUBMITTED: January 21, 1959

Card 4/4

KUSHTA, G.P.; RYBAYLO, O.I.

Submicrostructural characteristics of naturally aged aluminum-zinc solid solutions. Izv.vys.ucheb.zav.; tsvet.met. 3 no.2:153-155 160.
(MIRA 15:4)

1. Chernovitskiy gosudarstvennyy universitet, kafedra rentgeno-metallofiziki.
(Aluminum-zinc alloys--Metallography) (Crystal lattices)

MIKHAYLYUK, I.P. [Mykhailiuk, I.P.]; MIKHAL'CHENKO, V.P. [Mykhal'chenko, V.P.]; KUSHTA, G.P. [Kushta, H.P.]

Temperature dependence of the X-ray interference intensity in
aluminium and chromium ferrite. Ukr.fiz.zhur. 7 no.11:1246-1251
N '62. (MIRA 15:12)

1. Chernovitskiy gosudarstvennyy universitet.
(X rays—Diffraction) (Aluminum) (Chromium alloys)

MIKHAL'CHENKO, V.P. [Mykhal'chenko, V.P.]; KUSHTA, G.P. [Kushta, H.P.]

Use of the X-ray diffraction method in determining Grüneisen's
constant for 12% chromium ferrite. Ukr. fiz. zhur. 8 no.7:
779-786 J1 '63. (MIRA 16:8)

1. Chernovitskiy gosudarstvennyy universitet.
(X-ray diffraction examination)
(Ferrite)

ACCESSION NR: AP4010410

8/0185/63/008/012/1358/1363

AUTHOR: Goshko, Ye. I.; Kushta, G. P.; Mykhal'chenko, V. P.

TITLE: The temperature dependence of the intensity of x-ray interferences of tungsten in the temperature range of 300-1100°K

SOURCE: Ukrayins'kyy fiz. zhurnal, v. 8, no. 12, 1963, 1358-1363

TOPIC TAGS: tungsten, W, x-ray interference, x-ray diffraction, diffractometer, interference intensity, Grueneisen constant, Debye-Waller theory

ABSTRACT: To further develop investigations of the temperature dependence of the intensity of x-ray interferences of pure metals and solid solutions, a study has been made with an x-ray diffractometer of the temperature dependence of the relative intensities of tungsten in a temperature range of 300-1100°K. As expected, due to the low value of the Grueneisen constant and the very low cubic expansion of tungsten, the weakening of the intensity of x-ray interferences with temperature are in good agreement with the Debye-Waller theory. The value of the x-ray characteristic of the temperature, THETA sub x-ray, determined by the slope of the straight line

Card 1/2

ACCESSION NR: AP4010410

$$\ln \frac{I_T}{I_{T_0}} = f(T)$$

was 302 / or - 9°K. The divergence between this value and the known value of THETA is explained. The authors thank I. P. Miskhaylyuk for taking part in the discussions. Orig. art. has: 11 formulas and 2 figures.

ASSOCIATION: Chernivets'kyi derzhuniversitytet (Chernovtsy State University)

SUBMITTED: 22Apr63

DATE ACQ: 20Jan64

ENCL: 00

SUB CODE: PH

NO REF SOV: 005

OTHER: 009

Card 2/2

MIKHAIL'CHENKO, V.P.; MIKHAYLYUK, I.P.; KUSHTA, G.P.

Calculating the anharmonicity of the thermal vibrations of a crystal lattice during the experimental determination of the integral intensity of X-ray interferences of polycrystals.
Fiz. met. i metalloved. 16 no.3:343-348 S '63. (MIRA 16:11)

1. Chernovitskiy gosudarstvenny universitet.

RYBAYLO, O.I.; KUSHTA, G.P.

Sample holder for a KROS-type X-ray camera. Zav.lab. 29 no.11:
1385-1386 '63. (MIRA 16:12)

1. Chernovitskiy gosudarstvennyy universitet.

MIKHAL'CHENKO, V.P. [Mykhal'chenko, V.P.]; KUSHTA, G.P. [Kushta, H.P.]

Degree of anharmonicity of thermal oscillations of the crystal
lattice in solids. Ukr. fiz. zhur. 9 no.7:799-800 J1 :64.

1. Chernovitskiy gosudarstvennyy universitet.

(MIRA 17:10)

MIKHAL'CHENKO, V.P.; KUSHTA, G.P.

Problem of determination of the Gruneisen constant by the X-ray method. Chekhosl fiz zhurnal 14 no.4:276-277 '64.

1. Chernovitskiy gosudarstvennyy universitet, Ukrainskaya SSR, g. Chernovtsy.

ACCESSION NR: AP4017359

S/0126/64/017/002/0256/0262

AUTHORS: Strongin, B. G.; Kushta, G. P.

TITLE: Internal friction in thermally treated Al-Zn alloys

SOURCE: Fizika metallov i metallovodeniya, v. 17, no. 2, 1964, 256-262

TOPIC TAGS: Al-Zn alloy, Zn, Al, internal friction, thermal treatment, continuous photoregistration method, photoregistration technique, relaxation effect, Al-Zn stress relaxation, phase hardening, hardening, phase transformation, phaseal recurrence

ABSTRACT: This report was presented in Voronezh at the Third All-Union Scientific Research Conference on relaxation phenomena in metals and alloys in October 1962. The effect of temperature on the internal friction in some Al-Zn alloys has been studied in order to provide data on the phase transformation and to determine the influence of the alloy state on the temperature-internal friction relationship. It was established that inelastic effects originate in alloys due to phase transformation. These effects are reflected on the temperature curves by the presence of peaks and recurvature points. The internal friction level was found to depend

Card 1/3

ACCESSION NR: AP4017359

on the hardening temperature and to decrease with the temperature increase (in samples containing 10% Zn). The phase transformations observed in these experiments caused a random atomic distribution at the grain boundaries and in the crystals. This phenomenon was responsible for a specific type of viscous metal flow at high temperatures. The random atomic distribution produced the appearance of the specific curve peaks (called "grain-boundary peaks"), the height of which increased with the increase in Zn concentration up to a certain maximum, and dropped subsequently (no peaks were observed with 25% Zn concentration). In all samples the internal friction level was increased at 100-200C because of the appearance of additional vacancies in the course of hardening. The thermographic analysis method used in this work made it possible to differentiate between the phase transformation peaks and the "grain-boundary peaks" on the curves. During the decomposition of solid Al-Zn solutions, a metastable phase is probably formed. In conclusion the authors express their thanks to Professor B. N. Finkel'shteyn (deceased) who suggested the topic of this investigation and showed a constant interest in this work. Orig. art. has: 4 figures.

ASSOCIATION: Chernovitskiy gosudarstvennyy universitet (Chernovtsy State University)

Card 2/3

ACCESSION NR: APL017359

SUBMITTED: 12Feb63

DATE ACQ: 18Mar64

ENCL: CO

SUB CODE: ML

NO REF SOV: 013

OTHER: 021

Card 3/3

L 41554-65 EWT(1)/EWT(m)/T/ENP(t)/ZEC(b)-2/ENP(b)/ZEA(c) P1-4 IJP(c)
J2/JG/GG

ACCESSION NR: AP5001237

S/0126/64/018/005/0664/0669

33
32
B

AUTHOR: Val'chikovskaya, V. A.; Rybaylo, O. I.; Kushta, G. P.

TITLE: Temperature dependence of the characteristic x-ray temperature in gold

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 5, 1964, 664-669

TOPIC TAGS: Debye temperature, crystal, thermal vibration, gold

ABSTRACT: The authors have experimentally determined the dependence of the Debye temperature in gold in the temperature interval from 16 to 700C. The "anharmonicity" of gold was estimated. The relationship

$$\frac{d \ln \theta}{dT} \approx -273.$$

was used as the measure of anharmonicity of thermal vibrations of the crystalline atoms. The deviations between this relation and the published data are discussed. The results permit the determination of the coefficient of the quasielastic force and of the coefficients of the third and fourth order. Orig. art. has: 8 equations,

Card 1/2

L 41554-65
ACCESSION NR: AP5001237

2 graphs, and 2 tables.

ASSOCIATION: Chernovitskiy gosuniversitet (Chernovtsy State University)

SUBMITTED: 21Jan64

ENCL: 00

SUB CODE: MM, GC

NR REF SOV: 005

OTHER: 013

File
Card 2/2

VENGRINOVICH, R.D. [Venhrynovych, R.D.]; GESHKO, Ye.I. [Heshko, IE.I.];
KUSHTA, G.P. [Kushta, H.P.]; MIKHAL'CHENKO, V.P. [Mykhal'chenko,
V.P.]

Temperature dependence of the intensity of X-ray interferences in
nickel in the 300° - 1100°K temperature range. Ukr. fiz. zhur. 10
no.2:196-205 F '65. (MIRA 18:4)

1. Chernovitskiy gosudarstvennyy universitet.

L 40182-66 SWT(m)/T/EMP(t)/ETI IJP(c) JD/JG

ACC NR: AP6029384

SOURCE CODE: UR/0126/66/021/004/0519/0523

AUTHOR: Val'chikovskaya, V. A.; Kushta, G. P.; Rybaylo, O. I.

ORG: Chernovitsy State University (Chernovitskiy gosuniversitet)

TITLE: Temperature dependence of the lattice parameter and intensity of regular x-ray reflections for Au-Ag alloys [This paper was presented at Section of Lattice Dynamics of the 8th All-Union Conference on Roentgenography held in Leningrad in November 1964.]

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 4, 1966, 519-523

TOPIC TAGS: temperature dependence, lattice parameter, x ray study, silver alloy, gold alloy, alloy composition, radiography

ABSTRACT: The article presents the results of an investigation of the temperature and concentration dependence of lattice parameter and characteristic temperature for Au-Ag alloys containing 10, 25, 40, 60, 70 and 90% Ag, along with calculations of the universal lattice anharmonicity

parameter $\gamma\beta \approx \frac{d \ln \theta}{dT}$ (γ is the Grueneisen constant, β is the coefficient of volume expansion). Composition-property diagrams are constructed for Au-Ag alloys with "p perty" pertaining to the values of $\theta_{x\text{-ray}}$ and $\gamma\beta$. It is shown that these diagrams are in qualitative correspondence with the present-day concepts of the statistical theory of

Card 1/2

UDC: 539.26:669.225

09/7

2628

L 46102-66

ACC NR: AP6029384

alloys. A correlation is established between the quantities n , $\gamma\beta$ and mixing energies of the alloys; this is a major finding considering that the mixing energy determines the type of the constitution diagram of the alloy. Selection of the Au-Ag system as the object of investigation was primarily dictated by the lack of corresponding data on these alloys in the published literature. Moreover, alloys of this system lack such side-effects as static distortion, oxidizability, and ordering which, if present, complicate the radiographic experiment and interpretation of the findings. Orig. art. has: 6 figures. [JPRS: 36,774]

SUB CODE: 20, 14, 11 / SUBM DATE: 23Mar65 / ORIG REF: 008 / OTH REF: 006

Card 2 of 2

L 11245-66 ENT(m)/EMP(j)/T RM

ACC NR: AP6002105

SOURCE CODE: UR/0062/65/000/011/2077/2079

AUTHOR: ^{44 55} Kotlyarevskiy, I. L.; ^{44 65} Zanina, A. S.; ^{44 55} Shergina, S. I.; ^{44 55} Kushta, V. G. ⁵⁰

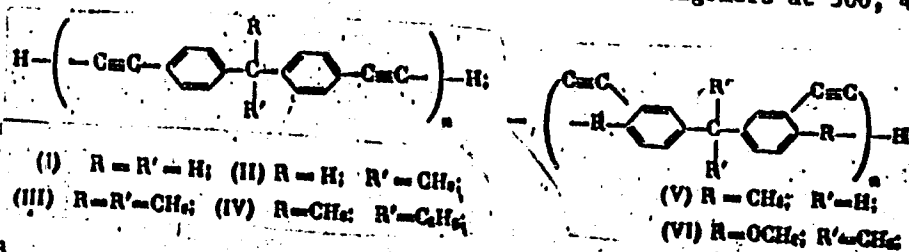
ORG: Institute of Chemical Kinetics and Combustion of the Siberian Department of the Academy of Sciences SSSR (Institut khimicheskoy kinetiki i gorennya Sibirskogo otdeleniya Akademii nauk SSSR)

TITLE: Electrophysical properties of certain polyethynylpolyarenes ^{7.14.55}

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 11, 1965, 2077-2079

TOPIC TAGS: organic semiconductor, semiconducting polymer, pyrolysis

ABSTRACT: A study has been made of the electrical conductivity, its temperature dependence, and conduction type of polyethynylpolyarene oligomers I to X and of the pyropolymers produced by heat treatment of these oligomers at 300, 400, and 500°C:

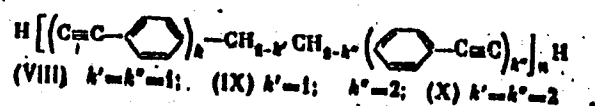
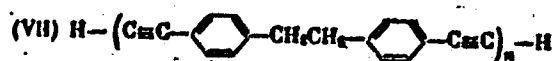


Card 1/3

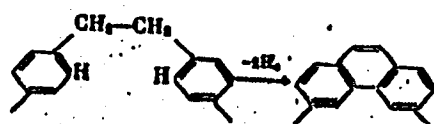
UDC: 537.311+541.6+547.362

L 14245-66

ACC NR: AP6002105



All the polymers were p-type. All of compounds I to II, when heat treated up to 300C, remained typical dielectrics at room temperature. Activation energy for conduction increased with the degree of branching. After heat treatment of I to VI to 400C and especially to 500C, properties typical of semiconductors appeared owing to the formation via triple bonds of three-dimensional cross-linked structures. However, even in this case, the conductivity of I to VI did not exceed 10^{-7} to 10^{-11} mho/cm owing to breaks in their conjugated systems. In contrast, oligomer VII, after heat treatment at 500C, irreversibly acquired a high conductivity (10^{-4} mho/cm) at an activation energy of 0.1 ev, a thermoelectric power of 37 $\mu\text{V}/\text{C}$, and a nonlinear volt-ampere characteristic. The typical semiconducting properties of VII heat treated at 500C were attributed to cyclization:



Card 2/3

L 11245-66

ACC NR: AP6002105

Of oligomers VIII to X, X has the most interesting properties (conductivity of the 500C pyropolymer, 10^{-4} mho/cm). It is concluded that preparative efforts aimed at obtaining polyethynylpolyarenes with predetermined properties (good solubility and conductivity) should be directed toward the synthesis of oligomers similar to VII and having substituents in the methylene bridge. Orig. art. has: 1 table and 1 figure. [SM]

SUB CODE: 11, 20/ SUBM DATE: 04Mar65/ ORIG REF: 003/ ATD PRESS: 4173

Card 3/3

KUCHTALOV, G. N.

Cand. Tech. Sci.

Dissertation: "Specific Weight and Thermal Properties of Fish Raw Materials." Moscow
Technical Inst of Fish Industry and Economy imeni A. I. Mikoyan, 19 Dec 47.

SO: Vechernyaya Moskva, Dec, 1947 (Project #17836)

Kushtalov, G. N.

Heat conductivity of the meat of some commercial fish.
G. N. Kushtalov. *Sbornik Trudov Astrakhan. Tekhnol.
Inst. Rybnol. Prom. i Khim.* 1953, No. 2, 100-115; *Referat.
Zhur., Khim.* 1955, No. 4927. Theoretically calcd. and
exptl. data on the heat cond. of some fish are given.
M. Huseh

KUSHTALOV, G.N.; MEL'KOVA, L.A.

Canned small fish and vegetables. Izv. vys. ucheb. zav.; pishch.
tekh. no.3:74-78 '60. (MIRA 14:8)

1. Astrakhanskiy tekhnicheskiy institut rybnoy promyshlennosti
i khozyaystva, Kafedra tekhnologii rybnykh produktov.
(Fish, Canned) (Vegetables, Canned)

KUSHTALOV, G.N.

Working out and investigating the process of preparing canned sprat
paté. Izv.vys.ucheb.zav.; pishch.tekh. no.6:88-95 '61. (MIRA 15:2)

1. Astrakhanskiy tekhnicheskoy institut rybnoy promyshlennosti i
khozyaystva, kafedra tekhnologii rybnykh produktov.
(Sprats)(Fish, Canned)

KUSHTALOV, G.N.; KIRILLOVA, A.I.

Some investigations of the changes in moisture and fat content of fish occurring in its frying in oil. Izv. vys. ucheb. zav.; pishch. tekhn. no.3:96-100 '63. (MIRA 16:8)

1. Astrakhanskiy tekhnicheskiy institut rybnoy promyshlennosti i khozyaystva, kafedra tekhnologii rybnykh produktov.
(Fish, Canned)

L 47127-56 EWT(L)/EWP(o)/T/EWP(t)/ETI/EWP(k) IJP(c) JE/WW/HW/JG/AT/WH
ACC NR: AP6032301 (N) SOURCE CODE: UR/0226/66/000/009/0081/0083

AUTHOR: Kushtalova, I. P.; Ivanov, A. N.

ORG: Institute of Problems in Material Science, AN UkrSSR (Institut problem materialovedeniya, AN UkrSSR)

TITLE: Plastic deformation of refractory compounds

SOURCE: Poroshkovaya metallurgiya, no. 9, 1966, 81-83

TOPIC TAGS: refractory compound, titanium carbon compound, zirconium carbon compound, titanium boron compound, molybdenum silicon compound, plastic deformation

ABSTRACT: A series of specimens of refractory compounds TiC , ZrC , TiB_2 and $MoSi_2$ obtained by hot compacting were strain hardened by grinding which significantly increased their microhardness. The microhardness of the strain-hardened compounds ranged from 1060 dan/mm² for $MoSi_2$ to 2520 dan/mm² for TiC compared to the initial 739 and 2310 dan/mm². Annealing of the hardened compounds brought about recrystallization (see Fig. 1). The ratio of recrystallization temperature T_r to melting temperature T_m was found to vary within 0.48—0.53, which was considerably higher than that for

Card 1/2

Card 2/2 blg powder metallurgy

STERNIN, I. I. Genl. Sargent. Col.

Dissertation: "Conditions for Simultaneous Occurrence of Hydrogen Sulfide and Oxygen in Water Reservoirs." Moscow Technical Education Institution of the Fish Industry
-- IGBN'B/TWZ 12 Dec, 1947.

SO; Yekhernyaya Moskva, Dec, 1947 (Project #12336)

S/044/62/000/004/076/099
C111/C222

AUTHORS: Kushtan, V.I., Lomsadze, Yu.M., Shuba, I.M.

TITLE: On the theory of generalized functionals

PERIODICAL: Referativnyy zhurnal, Matematika, no. 4, 1962, 87,
abstract 4B412. ("Dokl. i soobshch. Uzhgorodsk. un-t. Ser.
fiz.-matem. n.", 1961, no. 4, 116 - 121)

TEXT: In quantum-field theory there exist so-called singular
functionals, e.g. the δ -functional $\delta[N(x) - N_0(x)]$ with the property
that

$$\int \delta N(x) \delta [N(x) - N_0(x)] = 1 ,$$

if the functional (continuous) integration extends over an open set of
functions containing $N_0(x)$. A definition of singular functionals is given

in the following way (as in the theory of generalized functions): The
singular functional (or, as the author terms it, hyperfunctional) is a

Card 1/2

On the theory of generalized functionals

S/044/62/000/004/076/099
0111/0222

linear continuous functional over the space of basis functionals (the infinitely often differentiable and finite functionals with natural topology). The support of the singular functionals is defined, and a procedure is developed to regularize divergent functional integrals in which the functional in the integrand has in discrete "points" singularities of the type of a "pole".

[Abstracter's note : Complete translation.]

Card 2/2

KUSHTAN, V.I.; KRIVSKIY, I.Yu.; DERFI, S.M.

Analyticity of a modified nucleonic Green function. Dokl. 1
soob. UzhGU. Ser. fiz.-mat. i ist. nauk no.5:16-20 '62.
(MIRA 17:9)

KUSHTAN, V.I.; LOMSDZE, Yu.M., dotsent; ROMANKO, G.D.

Principle of invariance claimed relative to the inversion of
each constant in the theory, and its consequences. Dokl. i
soob. UzhGU. Ser. fiz.-mat. i ist. nauk no.5:20-24 '62.
(MIRA 17:9)

5/036/62/043/002/031/053
2104/2108

AUTHOR: Kushtan, V. I.

TITLE: Some considerations on the existence of a scalar neutral meson

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 45, no. 2(8), 1962, 581-583

TEXT: Experimental data (G. Puppi. Rapport on the Annual International Conference of High Energy Physics at CERN, 1966, p. 39; L. Vertenza et al., Nuovo Cim., 14, 467, 1961) on the π^+p -scattering are evaluated by means of a method by G. Chew (Phys. Rev., 112, 1360, 1958) of extrapolation to a nonphysical pole, the existence of which is related to that of a scalar neutral meson. The possible existence of a scalar neutral meson with a probable mass of $(380^{+40}_{-80})m_e$ is stated. There are 3 figures and 1 table. ✓

ASSOCIATION: Uzhgorodskiy gosudarstvennyy universitet (Uzhgorod State University)

SUBMITTED: March 2, 1962
Card 1/1

SHUBA, I.M.; RCMANKO, G.D.; LOMSDADZE, Yu.M., dotsent; KUSHTAN, V.I.

On the $\mu^- + p \rightarrow e + p$ process. Dokl. i soob. UzhGU.
Ser. fiz.-mat. i ist. nauk no.5:24-26 '62. (MIRA 17:9)

KUSHNAN, V.I.

Remarks on resonance theory. Izv. vyz. ucheb. zav.; Fiz. no. 1:
105-108 1962 (MIRA 17:2)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

KUSHTAN, V.I.

Intermediate vector bosons and the mass difference between K^0_1 and K^0_2 mesons. Izv. vys. ucheb. zav.; fiz. 7 no.6:136-139 '64.

(MIRA 18:2)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.

82047

S/006/60/000/07/02/005
B012/B051

34000

AUTHOR: Kushtin, I. F.

TITLE: Determination of the Flying Height

PERIODICAL: Geodeziya i kartografiya, 1960, No. 7, pp. 30 - 36

TEXT: In this paper, the photogrammetric method of determining the flying height in the case of random locations of passpoints is investigated. Based on Fig. 1, which shows the air negative at the moment of exposure, formula (11) is derived for the absolute flying height H_{abs} in the case of vertical aerial survey. If the line connecting the points a and b on the air negative passes through the nadir, and if a and b are symmetrical with respect to the nadir, one obtains formula (12) which is recommended in the regulations for determining flying heights. The unknowns occurring in formula (11) can be determined from three equations, but this formula is inconvenient for the determination of H_{abs} , even if the values of the angles α and φ_a are known. Therefore, a special case is investigated here.

Card 1/3

62047

Determination of the Flying Height

S/006/60/000/07/02/005
B012/B051

The nadir serves as one end point of the line in question and the other end point is B, the coordinates and height of which are known. If the flying height is determined with respect to the plane passing through B, the correction for topography in formula (11) may be neglected. Formula (16) is derived. It contains three unknowns: H_{abs} , α , and φ_B . Both angles are eliminated by means of the three equations (17), and the final formula (22a) for H_{abs} is obtained. The computation of the flying height from this formula is schematically shown in a table. The permissible error in determining the flying height for the stereoscopic plotting of the topography is determined from formula (23). In the Severo-Kavkazskoye aerogeodezicheskoye predpriyatiye (North Caucasian Aerogeodetic Center) the flying heights H_{abs} in a mountainous region were determined by the method described with an average height difference per picture pair of 500 m. Experience shows that the distance d between a and b should not be measured on the air negatives with pinpointed nadir and passpoints before the plane photogrammetric net has been established. The passpoints should be selected in such a way that they are located on different sides of the

Card 2/3

82047

Determination of the Flying Height

S/006/60/000/07/02/005
B012/B051

photo nadir and are apart from the latter as far as possible. There are
3 figures and 1 table.

Card 3/3

KUSHTIN, I.F.

Computing the coordinates of fixed points. Geod. i kart. no.4:45-
47 Ap '61. (MIRA 14:5)
(Surveying) (Coordinates)

KUSHTIN, I.F.

Determining the camera height. Geod.1 kart. no.3:39-42 Mr '62.
(MIRA 15:12)

(Aerial photogrammetry)

KUSHTIN, I.F.

Introduction of corrections for relief. Geod. i kart. no.8;
46-49 Ag '63. (MIRA 16:9)
(Aerial photogrammetry)

KUSEUKOVA, R. I.

KUSEUKOVA, R. I.: "The effect of the material of a polisher on its operating qualities." Leningrad, 1955. Min Higher Education USSR. Leningrad Order of Labor Red Banner Technological Institute Leningrad Soviet, Chair of Glass Technology. (Dissertation for the Degree of Candidate of Technical Sciences)

SC: Knizhnaya Lotopis' No. 47, 19 November 1955. Moscow.

TOTESH, A.S.; KUSHUKOVA, R.I.

Investigating the performance of different polishing
materials. Trudy LTI no.49:46-51 '58. (MIRA 15:5)
(Grinding and polishing)
(Glass)

KINASHVILI, R.S., & M.YA. KUSHULI.

Opređenje usilii, deistvuiushchikh v kolenchatykh valakh. (In; Serensen, S V. Dinamika i prochnost' kolenchatykh valov. Moskva, 1948. p.350-372, illus., tables, diagrs., bibliography)

Title tr.; Determination of strain in crankshaft.

TJ182.Sh

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955/

Kushul' M. Ya.
KELASHOSHVILI, R.S. and M.YA.KUSHUL'.

Raschet na prochnost' kolenchatykh valov aviatsionnykh dvigatelei. (In: Serensen, S.V. Dinamika i prochnost' kolenchatykh valov. Moskva, 1948. p.398-421, illus., tables, diagrs., bibliography)

Title tr.: Strength calculation of aircraft engine crankshafts.

TJ192.Sh

SC: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

KUSHUL' M. Ya.

BABICH, S.I., kandidat tekhnicheskikh nauk; BILIMAN, B.S., professor, doktor tekhnicheskikh nauk; BEYZELMAN, M.S., inzhener; BELYAYEV, I.M., kandidat tekhnicheskikh nauk; BIRGER, I.A., kandidat tekhnicheskikh nauk; BUGUSLAVSKIY, P.Ye., kandidat tekhnicheskikh nauk; BURDOVICH, L.S., kandidat tekhnicheskikh nauk; VOLMER, A.S., professor, doktor tekhnicheskikh nauk; GONIKBERG, Yu.M., inzhener; GORDON, GORDON, I.Ye., professor, doktor tekhnicheskikh nauk; GORDON, I.O., professor; DIMENBERG, P.M., kandidat tekhnicheskikh nauk; DOSCHATOV, V.V., inzhener, IVANOV, A.G., kandidat tekhnicheskikh nauk; KIMASHVILI, R.S., professor; KODNER, D.S., kandidat tekhnicheskikh nauk; KOLONYTSYEV, A.A., kandidat tekhnicheskikh nauk; KRITIKOV, I.P., kandidat tekhnicheskikh nauk; KUSHUL' M. Ya., kandidat tekhnicheskikh nauk; LEVENSCHON, Ye.M., inzhener; MAZYRIN, I.V., inzhener; MALIBIN, M.S., kandidat tekhnicheskikh nauk; MARTYLOV, A.B., kandidat tekhnicheskikh nauk; NIEBERG, H.Ya., kandidat tekhnicheskikh nauk; NIKOLAYEV, G.A., professor, doktor tekhnicheskikh nauk; PETRUSEVICH, A.I., doktor tekhnicheskikh nauk; POZDNYAEV, S.N., dotsent; POMANOV, S.D., professor, doktor tekhnicheskikh nauk; PRIGOROVSKIY, N.I., professor, doktor tekhnicheskikh nauk; PRONIN, B.A., kandidat tekhnicheskikh nauk; RESHETOV, D.B., professor, doktor tekhnicheskikh nauk; SATEL', E.A., professor, doktor tekhnicheskikh nauk; SERENSEN, S.V.; SLOBODKIN, M.S., inzhener; SPITSYN, N.A., professor, doktor tekhnicheskikh nauk; STOLBIN, G.B., kandidat tekhnicheskikh nauk; TAYTS, B.A., kandidat tekhnicheskikh nauk; TETELBAUM, I.M., kandidat tekhnicheskikh nauk; UMANSKIY, A.A., professor, doktor tekhnicheskikh nauk; FEODOSYEV, V.I., professor, doktor tekhnicheskikh nauk;

(Continued on next card)

BABKIN, S.I.-- (continued) Part 2.

KHAYT, D.M., kandidat tekhnicheskikh nauk; SYDINOV, V.Ye., kandidat tekhnicheskikh nauk; SHRAYBER, M.W., inzhener, nauchnyy redaktor; SHEDROV, V.S., kandidat tekhnicheskikh nauk, nauchnyy redaktor; TSVETKOV, A.F., dokent, nauchnyy redaktor; SLONIKOV, I.I., inzhener, nauchnyy redaktor; MARKUS, M.Ye., inzhener, nauchnyy redaktor; KARGANOV, V.G., inzhener, nauchnyy redaktor; ACHERKAS, N.S., doktor tekhnicheskikh nauk, professor, redaktor; SERGLOV, T.F., tekhnicheskiiy redaktor

[Manual of machinery manufacture] Spravochnik mashinostroitel'ia; v trekh tomakh. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit. lit-ry. Vol.3. 1951 1093 p. (MLBA 10:9)

1. Deystvitel'nye chleny Akademii nauk USSR (for Serensen)
(Machinery)

KUSHUL', M.Ya.

Approximate method for the determination of critical speeds of shafts supported by several bearings and having varying cross sections. Paper. (MLRA 7:4)
koleb.i krit.skor. no.2:121-171 '53.
(Shafts and shafting) (Centrifugal force)

KUSHUL', M. Ya.

FD 271

USSR/Engineering

Card 1/1

Authors : Kushul', M. Ya., Shlyakhtin, A. V.

Title : Theory of the vibration-driving of a cylindrical rod into an elastic-plastic medium

Periodical : Iz. Ak. Nauk SSSR, OTN, 1, 92-104, Jan 1954

Abstract : Investigates ~~theory~~ of the steady process of driving a rod into an elastic-plastic medium under the action of a constant force (weight) and a harmonic disturbing force. In determining the reaction of the medium, lateral friction of the rod against the medium and head resistance are considered. Tables, graphs.

Institution :

Submitted : October 13, 1953. Presented by Academician I. I. Artobolevskiy.

KUSHUL', M.Ya., kandidat tekhnicheskikh nauk; KUZNETSOV, V.S., inzhener

Problems on the dynamics high speed spindles. Tekst.prom.15 no.10:
30-33 0'55. (MIRA 8:12)

(Spinning machinery)

KUSHUL' M.Ya.
ZVINOGRUDSKIY, N.V. (Moskva); KUSHUL', M.Ya. (Moskva).

Investigating the vibrations of high-speed spindles. Izv.AN SSSR.
Otd.tekh.nauk no.10:48-63 0 '56. (MIRA 10:1)

1. Institut mashinovedeniya Akademii nauk SSSR.
(Spinning machinery--Vibration)

KUSHUL, M. YA

U S S R .

98/115

53.011 :621.824

Transverse Vibration of Rotating
Shafts with Internal and External
Friction

Inv. Akad. Nauk, Otd,
Tekh. Nauk

(10), 60-74

1954

U. S. S. R.

M. YA KUSHUL

Natural and forced vibrations of shafts with mounted discs and dampers are discussed. A more precise hypothesis of internal absorption which lays down that the area of hysteresis loop does not depend on frequency, is applied. Forced vibrations are considered under the assumption that the equilibrium is being disturbed not only by the discs, but also by the shaft proper. (31b1,4)

gpp

SOV/24-58-10-25/34

AUTHOR: Kushul', M. Ya. (Moscow)

TITLE: On the Bending of Cantilever Plates Bounded by Piecewise Smooth Curves (Ob izgibe konsol'nykh plastin, ocherchennykh kusochno-gladkimi krivymi)

PERIODICAL: Izvestiya Akademii nauk, SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 10, pp 133-138 (USSR)

ABSTRACT: It is shown in this note that the variational formula of Kirchhoff which, as is well known, was first used to establish the boundary conditions for cantilever plates having angular points in the free part of the contour, should be supplemented by certain additional terms. In the study of the bending of cantilever plates by the variational method, homogeneous algebraic polynomials are normally used and these satisfy a biharmonic equation with the boundary conditions corresponding to the fixed end. Formulae are now derived which may be used to obtain these polynomials for any order however high. As an example, a solution is given for the case of the bending of a plate in the form of a right-angle isosceles triangle, fixed

Card 1/2

SOV/24-58-10-25/34

On the Bending of Cantilever Plates Bounded by Piecewise Smooth Curves

along the hypotenuse and loaded with a localised force at the apex corresponding to the right angle. It is shown that certain integrals which were taken as equal to zero by Kirchhoff when he evaluated the first variation of potential energy of the plate (δV) are not in fact zero if there are angular points on the free periphery. The reformulated problem leads to a correction to the Kirchhoff expression and the variational problem is solved by Ritz's method. There are 4 figures and 2 Soviet references.

SUBMITTED: January 13, 1958.

Card 2/2

16(1)

AUTHOR:

Kushul, M. Ya. (Moscow)

307/40-22-4-13/26

TITLE:

On Quasi-Harmonic Systems Which are Adjacent to Systems With Constant Coefficients in Which Purely Imaginary Roots of the Characteristic Equation Possess Nonsimple Elementary Divisors (O kvazigarmonicheskikh sistemakh, blizkikh k sistemam s postoyannymi koeffitsiyentami, u kotorykh chisto mnimyye korni fundamental'nogo uravneniya imeyut neprostyye elementarnyye deliteli)

PERIODICAL:

Prikladnaya matematika i mekhanika, 1958, Vol 22, Nr 4, pp 519 - 533 (USSR)

ABSTRACT:

The author investigates solutions of a quasi-harmonic equation of the type :

$$(1.1) \quad \dot{x}_s = \sum_{B=1}^n [a_{sB} + \mu f_{sB}(t, \mu)] x_B .$$

The coefficients of the equations are to depend in analytic form on the small parameter μ and for the case $\mu = 0$ are to transform into a system with constant coefficients. It is supposed that among the roots of the characteristic equation :

Card 1/3

On Quasi-Harmonic Systems Which are Adjacent to SOV/40-22-4-13/26
Systems With Constant Coefficients in Which Purely Imaginary Roots of the
Characteristic Equation Possess Nonsimple Elementary Divisors

$$|a_{s\beta} - \delta_{s\beta} \lambda| = 0$$

there exist purely imaginary roots, zero roots and multiple roots which differ from each other by an expression of the form

$$\frac{2\pi ni}{\omega}$$

All the elementary divisors which correspond to these roots are to be non-simple.

The connection between the structure of the matrix :

$$\|a_{s\beta} - \delta_{s\beta} \lambda\|$$

and the values $\mu^{1/r}$ is set up, where the latter value denotes the parameter in terms of the powers of which the characteristic roots are expanded. For the practical calculation of the characteristic exponents algebraic equations are derived from which the roots and their elementary divisors can be determined in first approximation.

Card 2/3

On Quasi-Harmonic Systems Which are Adjacent to SOV/40-22-4-13/26
Systems With Constant Coefficients in Which Purely Imaginary Roots of the
Characteristic Equation Possess Nonsimple Elementary Divisors

The results obtained are applied to the stability investigation of the periodic solutions of quasi-linear systems with several degrees of freedom. Such cases are particularly investigated in which the characteristic equation has purely imaginary or zero roots, the multiplicity of which is not equal to the number of groups of solutions which correspond to them. There are 3 figures, and 4 Soviet references.

SUBMITTED: November 27, 1957

Card 3/3

KUSHUL', M. Ya.

Doc Tech Sci - (diss) "Several cases of construction and study of the stability of stationary solutions to quasi-linear systems and their application to the theory of self-vibrations of flexible rotors." Moscow, 1961. 13 pp; (Academy of Sciences USSR, Inst of Mechanics); number of copies not given; price not given; (KL, 6-61 sup, 211)

88400

S/020/61/136/004/006/026
B019/B056

26.2194
AUTHOR:

Kushul', M. Ya.

TITLE:

Stability of Forced Oscillations in Self-rotating Systems

PERIODICAL:

Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 4,
pp. 787 - 790

TEXT: Self-rotating system is the term used by the author according to S. P. Strelkov (Ref.1) for a potentially self-exciting system, which is able to perform oscillations in two directions. The author investigated non-autonomous self-rotating systems, which are described by the equations of motion

$$\ddot{q} + \lambda^2 q = -\alpha \dot{q} - \gamma \delta (\dot{q} + \omega p) - \alpha_1 q (q^2 + p^2) + \beta \lambda^2 q (q^2 + p^2) + \varepsilon \omega^2 \cos \omega t$$

$$\ddot{p} + \lambda^2 p = -\alpha \dot{p} - \gamma \delta (\dot{p} - \omega q) - \alpha_1 p (q^2 + p^2) + \beta \lambda^2 p (q^2 + p^2) + \varepsilon \omega^2 \sin \omega t \quad (1).$$

q and p are the coordinate axes in the qp-plane. These equations are used to describe the motion of an unbalanced rotor, whose rated speed is between two critical numbers of rotations of first and second order (turbines, spinning-machine spindles etc.), it being assumed that gyro-

Card 1/3

88400

Stability of Forced Oscillations in Self-rotating Systems

S/020/61/136/004/006/026
B019/B056

scopic mass effects may be neglected. In this system, λ is the lower natural frequency of small natural oscillations of the rotor; ω denotes their angular velocity; ξ characterizes the unbalance of the rotor; the summands which have α_1 as coefficient, express the increase of the damping decre-

ment with an increase of the oscillation amplitude, and the summands with β as coefficient describe the curvature of the rotor shaft axis. The system (1) has particular periodic solutions $q = d \cos(\omega t + \varphi)$ and

$p_0 = d \sin(\omega t + \varphi)$, where $d = -\xi \omega^2 / \sqrt{(\omega^2 - \lambda^2 + \beta \lambda^2 d^2)^2 + \omega^2 (\alpha + \alpha_1 d^2)^2}$ and

$\tan \varphi = \omega (\alpha + \alpha_1 d^2) / (\omega^2 - \lambda^2 + \beta \lambda^2 d^2)$ (2). These solutions represent the forced oscillations. With a variational problem in which $q = q_0 + x_1$ and $p = p_0 + x_2$ are put, a unique stability condition of the solution (2) is obtained:

$$\operatorname{Re}(2b_2) = -\alpha - \gamma \delta - \alpha_1 d^2 + \frac{\omega}{\lambda} |\gamma \delta - \alpha_1 d^2| < 0 \quad (4).$$

The relation $\alpha_1 y_0^2 = \gamma \delta (\frac{\omega}{\lambda} - 1) - \alpha - \alpha_1 d^2 (\frac{\omega}{\lambda} + 1)$ is given, and it is found that in that range of ω , where $y_0^2 > 0$ and $\operatorname{Re}(2b_2) > 0$, and therefore

Card 2/3

88400

Stability of Forced Oscillations in Self-rotating Systems

S/020/61/136/004/006/026
E019/B056

solution (2) is instable. This instability is caused by internal friction and is within the range $\omega_1 < \omega < \omega_2$. As shown by (4), a second unstable range appears with a further increase of ω , whose lower limit is, however, mostly so high that it is practically not attained. This second range is, contrary to the first, caused by the nonlinear terms of the external friction. Internal friction has a stabilizing effect in this case. The results seem to be somewhat unexpected in the author's view, and in the last part, he proves their correctness. By a transformation of (1), a quasi-harmonic system of equations is obtained which proves the correctness of the above results. There are 1 figure and 7 references: 6 Soviet and 1 US. X

PRESENTED: June 8, 1960, by I. I. Artobolevskiy, Academician

SUBMITTED: May 31, 1960

Card 3/3

KUSHUL', Mikhail Yakovlevich; DIMENTBERG, F.M., doktor tekhn. nauk,
otv. red.; LETNEV, B.Ya., red.izd-va; GRIGOR'YEVA, Ye.K.,
tekhn. red.

[Natural vibrations of rotors; dynamics of high-speed
spindles] Avtokolebaniia rotorov; dinamika bystrokhodnykh
vereten. Moskva, Izd-vo Akad.nauk SSSR, 1963. 164 p.

(MIRA 16:4)

(Rotors--Vibration)

IORISH, Yu.I.; ANTSEYEROV, M.S., kand. fiz.-mat. nauk, retsenzent;
ERANOVSKIY, M.A., kand. tekhn.nauk, red.; BRATANOVSKIY, V.A.,
red.; BYKHOVSKIY, I.I., inzh., red.; VASIL'YEVA, R.V., inzh.,
red.; KONITYSSKIY, Ya.I., kand. tekhn. nauk, red.; KUSHUL',
M.Ya., doktor tekhn. nauk, red.; PEVZNER, L.A., inzh., red.;
SHMELEV, V.A., kand. tekhn. nauk, red.; BYSTRITSKAYA, V.V.,
red.izd-va; UVAROVA, A.F., tekhn. red.

[Vibrometry; measurement of vibrations and shocks, general
theory, methods and devices] Vibrimetriia; izmerenie vibra-
tsii i udarov. Obshchaia teoriia, metody i pribory. Izd.2.,
perer. i dop. Moskva, Mashgiz, 1963. 771 p. (MIRA 17:2)

S/0179/64/000/002/0061/0077

ACCESSION NR: AP4035060

AUTHOR: Kushul', M. Ya. (Moscow); Shlyakhtin, A. V. (Moscow)

TITLE: Balancing flexible rotors

SOURCE: AN SSSR. Izvestiya. Mekhanika i mashinostroyeniye, no. 2, 1964, 61-77

TOPIC TACS: rotor, balancing, flexible rotor, rotor balancing, flexible rotor balancing

ABSTRACT: The operating speed of the rotors of many machines exceeds the first second and even third critical velocities. Thus the problem of balancing rotors as elastic bodies has arisen in the last ten years. The present article is concerned with the theory of the balancing of flexible rotors on the basis of the form of their oscillations. These rotors are of more complex construction than ordinarily considered: multi-supported and of variable cross section with the mass distributed along its length.

1/2

Cord

ACCESSION NR: APL035060

The gyroscopic effect of the mass however is assumed to be negligibly small. The same mathematical formalism used in an earlier work of the author (Kushul', M. Ya. Avtokole baniya rotorov. Izd-vo AN SSR, 1963) is used to study the dynamics of flexible rotors. The article shows that balancing loads can be used to fully balance primary forms, independent of a number of bearings of the rotor and the amount of mass. The relation between the statistical moments of the balancing loads which balance the k-th form of complex rotors can be uniquely determined without disturbing the remaining n-1 forms. The value of these relationships can considerably simplify the balancing process. Certain considerations concerning the choice of the positions of the balancing planes are also included.

Examples are given which illustrate certain theoretical assumptions used in the paper and the results of balancing flexible rotors by various methods are compared.

ASSOCIATION: none

DATE ACQ: 20May64

ENCL: 00

SUBMITTED: 29Oct63

NO REF SOV: 006

OTHER: 006

SUB CODE: IE, MG

Cord 2/2

ACC NR: AP6011129

SOURCE CODE: UR/0424/66/000/001/0041/0052

AUTHOR: Kuchul', M. Ya. (Moscow)

ORG: none

TITLE: Almost-periodic oscillations of nonlinear systems containing quasi-cyclic coordinates

SOURCE: Inzhenernyy zhurnal. Mekhanika tverdogo tela, no. 1, 1966, 41-52

TOPIC TAGS: periodic system, nonlinear vibration, differential equation,

ABSTRACT: Nonlinear systems are considered which, along with the coordinates x_1, \dots, x_n appearing in steady periodic or almost periodic oscillations, contain angular coordinates $\varphi_1, \dots, \varphi_h$ to denote a rotary motion. These are given by

$$\frac{d^2\varphi_r}{dt^2} = \mu \Phi_r(t, x, \varphi, \varphi', \mu) \quad (r=1, \dots, h)$$

$$\frac{dx_s}{dt} = \sum_{\beta=1}^n a_{s\beta} x_\beta + f_s(t, \varphi, \varphi') + \mu F_s(t, x, \varphi, \varphi', \mu) \quad (s=1, \dots, n=2q)$$

where μ is a small parameter and f_s, F_s, Φ_r are almost-periodic functions in t and periodic functions in the angular coordinates $\varphi_1, \dots, \varphi_h$. It is desired to formulate and investigate the stability of possible stationary solutions of this system. After

Card 1/3

ACC NR: AP6011129

several substitutions and a Krylov-Bogolyubov transformation, these equations are rendered in the form

$$\frac{d\Omega_r}{dt} = \mu X_r(y, \Omega, \theta, c) + \mu^2 X_r^*(t, y, \theta, \Omega, \varphi, \mu) \quad (r=1, \dots, h)$$

$$\frac{dy_k}{dt} = \mu Y_k(y, \Omega, \theta, c) + \mu^2 Y_k^*(t, y, \theta, \Omega, \varphi, \mu) \quad (k=1, \dots, g)$$

$$\frac{d\theta_k}{dt} = \lambda_k - \lambda_k^0(\tau) + \mu Z_k(y, \Omega, \theta, c) + \mu^2 Z_k^*(t, y, \theta, \Omega, \varphi, \mu)$$

where Ω , y , θ vary slowly. To a first approximation, their values can be obtained from the averaged equations

$$\frac{d\Omega_r}{dt} = \mu X_r(y, \theta, \Omega, c), \quad \frac{dy_k}{dt} = \mu Y_k(y, \theta, \Omega, c)$$

$$\frac{d\theta_k}{dt} = \lambda_k - \lambda_k^0(\tau) + \mu Z_k(y, \theta, \Omega, c).$$

To further construct an almost-periodic solution to the above approximate equations, an integral relationship must exist between the frequencies $\lambda_1^0(\tau), \dots, \lambda_g^0(\tau), \omega_1, \dots, \omega_p$ and the angular velocities $\Omega_1, \dots, \Omega_h$. Under resonance conditions these first approximation equations take on the form

$$\frac{d\Omega_r}{dt} = \mu X_r(y, \chi, \Omega), \quad \frac{dy_k}{dt} = \mu Y_k(y, \chi, \Omega)$$

$$\frac{d\chi_b}{dt} = \sum_{i=1}^g m_{i,b}^{(b)} (\lambda_i - \lambda_i^0) + \mu \sum_{i=1}^g m_{i,b}^{(b)} Z_i(y, \chi, \Omega)$$

$$\frac{d\theta_k}{dt} = \lambda_k - \lambda_k^0 + \mu Z_k(y, \chi, \Omega)$$

Card 2/3

ACC NR: APC011129

which are shown to have stationary solutions

$$y_k = y_k^0, \quad \chi_b = \chi_b^0, \quad \Omega_r = \Omega_r^0$$

$$\theta_k = (\lambda_k - \lambda_k^0)t + \mu Z_k(y^0, \chi^0, \Omega^0)t + \varepsilon_k.$$

Finally, it is assumed that $\omega_1 = \dots = \omega_p = 0$, and two cases are investigated for possible stationary, almost-periodic solutions. These correspond to the cases

$$\Omega_1 = \Omega_2 = \dots = \Omega_{p-1}, \quad \lambda_1 - \Omega_1 = 0(\mu),$$

$$\Omega_p = \Omega_{p+1} = \dots = \Omega_h, \quad \lambda_2 - \Omega_p = 0(\mu).$$

Orig. art. has: 63 equations.

SUB CODE: 20, 12/SUBM DATE: 05Mar65/ ORIG REF: 004

Card 3/3

ACC NR: AP6034143

(N)

SOURCE CODE: UR/0424/66/000/005/0045/0053

AUTHORS: Zeytman, H. F. (Moscow); Kushul', M. Ya. (Moscow)

ORG: none

TITLE: Nonlinear vibrations of elastic pendula with elastic connections

SOURCE: Inzhenernyy zhurnal. Mekhanika tverdogo tela, no. 5, 1966, 45-53

TOPIC TAGS: vibration, nonlinear differential equation, pendulum motion, approximation method

ABSTRACT: The planar motion of an elastic pendulum whose arm can be deformed in deflection is analyzed. The rigidity of the pendulum EI, shown in Fig. 1, is assumed to be constant, and a helical spring with stiffness constant k is placed at the point of support O. The equation of motion for the mass m and the equation of bending deformation for the tie rod are written separately, and (for small amplitude vibrations), the natural frequency equation of the system is expressed by the bi-quadratic

$$0^4 [(c_1\alpha - c_2) + c_1\alpha\beta (c - c_2)] v_0^4 - g/l \{ 0^3 [c_1\alpha\beta (c - c_2 + 2) + (c_1\alpha - c_2 + 1)] + (1 + c\beta) \} v_0^2 + (g/l)^2 [1 + \beta (c + 1)] = 0$$

$$\left(\beta = \frac{k}{mg}, \quad \theta = \frac{\rho}{l} \right).$$

Card 1/3

ACC NR: AP6034143

For zero rod-mass, this equation is simplified to

$$\ddot{\varphi} + \frac{k}{l}(1 + \kappa)\varphi + \frac{k}{6l}(3d\kappa^2 - 1)\varphi^3 - d\kappa^3\varphi\dot{\varphi}^2 = 0$$

$$\left(\kappa = \frac{k}{mgl + ck} = \frac{\beta}{1 + c\beta}\right),$$

which lends itself to the periodic solution

$$\varphi = A \cos \tau + A^3 \varphi_3(\tau) + A^5 \varphi_5(\tau) + \dots$$

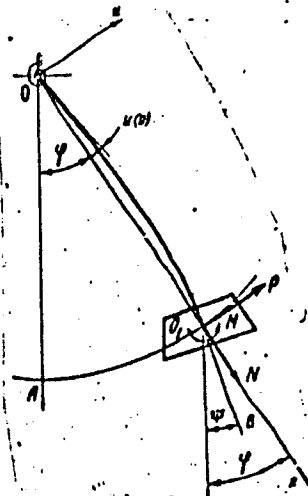


Fig. 1.

Card 2/3

ACC NR: AP6034145

The analysis is then extended to the case where a forcing function $q \sin \omega t$ is applied to the system. Finally, a general case is considered, in which the elastic pendulum rod contains n -masses of unequal weights, distributed evenly along its length. Orig. art. has: 40 equations and 6 figures.

SUB CODE: 20/ SUBM DATE: 03May66/ ORIG REF: 002/ OTH REF: 001

Card 3/3

~~KUSHUL~~
LAPSHIN, Aleksandr Aleksandrovich, kand.tekhn.nauk; ~~KUSHUL, Veniamin~~
Moiseyevich, kand.tekhn.nauk; UDAL'TSOV, A.N., glavnyy red.;
TOLCHINSKIY, M.Ye., inzh.red.

[The EV-53 electronic hygrometer. A device for gauging and
signaling pressure drops] Elektronnyi vlagomer EV-53. Pribor
dlya izmereniya i signalizatsii perepada davlenii. Moskva,
1956. 12 p. (Pribory i stendy. Tema 4, no.P-56-437)

(NIRA 11:3)

1. Moscow. Institut tekhniko-ekonomicheskoy informatsii.
(Hygrometry) (Pressure gauges)

Kushul, V.M.

124-1957-10-11829

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 10, p 91 (USSR)

AUTHOR: Kushul, V. M.

TITLE: An Instrument for Measuring and Signaling Pressure Drops
(Pribor dlya izmereniya i signalizatsii perepada davleniy)

PERIODICAL: Tr. Leningr. in-ta aviats. priborostr., 1956, Nr 11, pp 29-34

ABSTRACT: This instrument, operating on a hydraulic principle, is intended to measure and signal small pressure drops between two points. An electric signaling device, employing a contact between a contact rod and a mercury column in the measuring tube, transmits a signal whenever a given permissible drop has been attained. This apparatus is accurate within one percent of its extreme pressure-drop reading.

S. G. K.

Card 1/1

SOV/124-59-8-8740

Translation from: Referativnyy zhurnal, Mekhanika, 1959, Nr 8, p 63 (USSR)

AUTHOR: Kushul', V.M.

TITLE: Investigation of the Effect of the Compression Ratio and the Excess-Air Coefficient on the Effective Efficiency of Internal-Combustion Engines

PERIODICAL: Tr. Leningr. in-t aviats. priborostr., 1958, Nr 26, pp 17 - 27

ABSTRACT: The author determines the dependences and analyzes the effect of the compression ratio and of the excess-air coefficient on the thermal, relative, and mechanical efficiency of internal-combustion engines. It is pointed out that the economy of the engines increases by 30% with increasing compression ratio up to 11 - 12 in comparison with the effective efficiency for a compression ratio of 6. At a further increase in the compression ratio beyond 11 - 12 the effective economy almost does not change, but an increasing combustion pressure causes a considerable increase in the dead load of the engine. Moreover, it is shown that the application of qualitative regulation of the mixture composition is

Card 1/2

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SOV/124-59-8-8740

Investigation of the Effect of the Compression Ratio and the Excess-Air Coefficient on the Effective Efficiency of Internal-Combustion Engines

important for the underloaded engine. This regulation means the implementation of the engine operation with poor mixtures having a large value of the excess-air coefficient (up to $\alpha = 6$). When the mixture regulation is qualitative the engine economy increases under half-load conditions by 14% and under quarter-load conditions by 21% in comparison with the usually applied quantitative regulation. The author cites tables and graphs of the dependences of the efficiency on the compression ratio and the excess-air coefficient.

I.A. Lukashevich



Card 2/2

L 9075-65 EWT(1)/EWT(m)/T-2 AFIC(p)/AFIC(a)/ASD(d)/AEDC(b)/AFETR JD

ACCESSION NR: ARH031827

S/0273/64/000/001/0006/0006

SOURCE: Referativnyy zhurnal. Dvigateli vnutrennego sgoraniya. Otdel'nyy
vypusk, Abs. 1:39:22

AUTHOR: Kushul', V. M.

TITLE: Experimental research on a new type of internal combustion engine

CITED SOURCE: "Tr. Leningr. in-t aviats. priborostr.", vyp. 38, 1962, 170-252

TOPIC TAGS: engine, internal combustion, internal combustion engine, engine de-
sign, internal combustion engine design, engine testing

TRANSLATION: A description is given of testing methods and an installation for
the tests. There is an examination of the effect of various design parameters
on the working process of the engine: design finishing, testing and determination
of the efficiency index and economy factor. The basic characteristics are given
which are obtained as a result of tests on the stand. It is noted that the
studies confirm the basic theoretical premises and design data for the new thermo-
dynamic cycle and the new engine operating principle. Orig. art. has 45 figures

Card 1/2

L 9075-65

ACCESSION NR: AR1031827

and 7 tables: B. Solov'yov.

SUB CODE: PR

ENCL: 00

Card 2/2